finished debarked and cut log area. Figure 1 illustrates a parallel log processing line whereby two trains of raw logs can be debarked and cut simultaneously. It will be understood that only one log train can be used or that further parallel log processing lines can be added.

As seen in schematic plan in Figure 1, the overall dual parallel log sorting, singulating, debarking and log cutting trains are illustrated generally by reference numeral 2. The first barker infeed deck 4 and the second corresponding barker infeed deck 6 provide locations where the raw log grappler 3 can lift raw logs from a log pile which is supplied by trucks hauling raw logs from the timber stand, and dumping the logs on the decks 4 and 6.

The first quadrant barker feeder 8 and the second quadrant barker feeder 10 feed raw logs from the corresponding first and second barker infeed decks 4 and 6 to corresponding first dual quadrant singulator 12 and second dual quadrant singulator 14. The first and second stream of raw logs singulated by the first and second dual quadrant singulators 18 and 14 are dropped onto corresponding first barker infeed conveyor 16 (first section) and second barker infeed conveyor 18 (first section). Once the raw logs reach the ends of the first and second conveyors 16 and 18, they are conveyed further by the corresponding first barker infeed conveyor 20 (second section) and second barker infeed conveyor 22 (second section). The conveyors 20 and 22 then feed the respective streams of raw logs to the first debarker 24 and the second debarker 26. The first and second debarkers 24 and 26 are unique and have automatic variable ring speed, variable cutting tool pressure, log diameter adjustment capability and variable log speed handling capability. This minimizes bark cutting overlap (which is wasteful and time consuming because the rotating blades retrace debarked area) and depth of cut white wood (which is wasted).

After the first and second raw logs have been optimally debarked, they are conveyed away from the first and second barkers 24, 26 by first barker outfeed conveyor 28 and second barker outfeed conveyor 30. The barked first and second logs are then passed respectively through a first bucking line scanner 32 and a second bucking line scanner 34, where the log profiles of the debarked logs are profiled by a triple log scanning system, which transmits the scan data to a computer. The triple scanners, in a preferred embodiment, are laser scanners and continuously determine the log diameter, the log profile including curves, crooks,

taper, and sweep, as well as volume. The computer is then able from this data to determine optimum saw cut locations so as to maximize the amount of useful timber that can be cut from each log.

Once the first and second logs have been scanned, and the scan data transmitted to and analyzed by the computer, they are conveyed respectively by first bucking line conveyor 36 and second bucking line conveyor 38. At that point, the first and second barked and scanned logs are swept to the first bucking line and the second bucking line respectively by first sweep 40 and second sweep 42. The first and second logs then are handled by first bucking line stop-loader and second bucking line stop-loader 44 and 46 respectively. The logs are then dropped onto first bucking line cradle 48 and second bucking line cradle 50 respectively.

The first scanned and barked log lying in the first bucking line cradle 48 and the second scanned and barked log lying in the second bucking line cradle 50 are then, as determined by the computer scan, according to optimum saw cut points, positioned by first bucking line positioner 52 and second bucking line positioner 54. In other words, the butt ends of the respective pair of logs are contacted respectively by the first positioner 52 and second positioner 54 and moved by the positioners to the optimum locations on the first and second cradles 48 and 50 for cutting by the two pairs of saw. This feature of the two log bucking areas is unique and is highly efficient. Once the first and second logs are optimally positioned respectively by the first bucking line positioner 52 and the second bucking line positioner 54, they are respectively cut by the first pair of bucking line saws 56 and the second pair of bucking line saws 58. Figure 1 shows a pair of cut-off saws 56 and 58 in both the first and second log handling lines, but only one saw in each line can be used, or additional saws can be added. One saw may be all that is required for short logs. Long logs may require three or more logs.

Once the first and second logs have been cut into respective segments by the first and second bucking saws 56 and 58, the logs are conveyed away from the bucking saws 56 and 58 by respective first bucking line outfeed conveyor 60 and second bucking line outfeed conveyor 62. The velocity of travel of the first and second logs is accelerated respectively by first bucking line log accelerator 64 and second bucking line log accelerator 66. The propelled logs then reach respectively the first bucking line log sort conveyor 68 and the second bucking line log sort conveyor 70. Subsequently, the first and second logs are swept laterally by first

bucking line sweep No. 1 and log catcher 72, and second bucking line sweep No. 1 and log catcher 74.

As shown in Figure 1, the log bucking area is set up with a pair of cut-off saws in each of the parallel log bucking lines, which thereby cuts the scanned logs into three separate components. A command signal is sent from the computer to the log sorting system, which tracks the position of the random log lengths and enables them to be sorted to the appropriate sort storage bin.

The log components, according to the length of each cut segment, are sorted by first bucking line sweep No. 76 and second bucking line sweep No. 78 and first bucking line sweep No. 3 and second bucking line sweep No. 80, 82, as determined by the computer and according to the length of the segments that have been cut for each cut log.

Figure 1 also shows the location of the barking area operator cab 84 and the bucking area operator cab 86. An operator sitting in the first cab 84 can conveniently view the log deck and singulating area and intervene when something goes amiss in the raw log handling area, such as two logs being dropped on a conveyor belt, or a log ends up crossways. An operator sitting in the cab 86 can conveniently view the bucking area and intervene if a hitch of some sort develops in the bucking area. The computer is housed in computer room 88. The log sorting barking and bucking system according to the invention can be operated quickly and efficiently by only two operators, whereas previously nine or more personnel were required to handle the same volume of logs for processing, barking and cutting.

Figure 2 illustrates a detailed enlarged schematic plan of the quadrant/barker area including the general arrangement of the raw log processing equipment. The raw log grappler 3 loads raw logs from a truck supplied log pile onto the first barker infeed deck 4 and the second barker infeed deck 6 respectively. From there, the respective first and second logs are moved to first quadrant barker feeder 8 and second quadrant barker feeder 10, as indicated by the arrows. The first and second logs are then singulated by the first dual quadrant singulator 12 and the second dual quadrant singulator 14 respectively.

The first and second singulated logs are then conveyed to the respective barkers 24 and 26 by the first barker infeed conveyor 16 and the second

barker infeed conveyor 18 respectively. Reference numerals 16 and 18 denote the first sections of the respective log conveyors 16 and 18. The first and second singulated logs are then conveyed from the first section of the first and second infeed conveyors 16 and 18 to the second sections of first barker infeed conveyor 20 and the second section of barker infeed conveyor 22. First and second section conveyors are advantageous because they circumvent the need to have long break-down prone conveyors.

The first and second logs are then fed respectively to the first debarker 24 and the second debarker 26. The first debarker 24 and the second debarker 26 are of unique construction because they utilize variable ring speed, rather than constant ring speed, variable bark removing knife pressures, and variable log diameter handling capability in order to achieve maximum debarking efficiency and minimum white wood cuttings. The foregoing variables also minimize bark cutting overlap, thereby resulting in improved efficiency.

Figure 3 illustrates an end elevation of a dual log quadrant feeder 12 (also known as a singulator). As can be seen in Figure 3, the dual quadrant singulator 12 is constructed of a lower large diameter quadrant feeder 13 and a smaller diameter upper quadrant feeder 15. Lower quadrant feeder 13 has a counterbalance weight 17, while upper quadrant feeder 15 has a similar balance weight. These weights reduce the force required to lift the respective quadrant. The combination of lower and upper quadrant feeders has been found to be very advantageous in ensuring proper singulation of the raw logs which can have many imperfections such as broken branch stumps, crooks, twists, sweeps, and the like, thus increasing the difficulty of singulating the logs on a reliable and trouble-free basis. The dual feeders 13 and 15 increase the likelihood that the logs are properly singulated before they are dumped onto the barker infeed conveyor 16. This results in minimized down time due to the dual quadrants inadvertently picking up two or more logs, or no logs at all.

Figure 4 illustrates an enlarged detailed schematic plan of the cut-off saw area showing the general arrangement of the log sawing and handling equipment. After the first and second lines of raw logs have been debarked, they are conveyed away from the first and second barkers by first barker outfeed conveyor 28 and second barker outfeed conveyor 30. The barked first and second logs are then passed respectively through a first bucking line scanner 32 and a second

bucking line scanner 34, where the log profiles of the debarked logs are profiled by a triple log scanning system, and accessed by the computer.

Once the first and second logs have been scanned, they are conveyed respectively by first bucking line conveyor 36 and second bucking line conveyor 38. The first and second barked and scanned logs are then swept to the first bucking line and the second bucking line respectively by first sweep 40 and second sweep 42. At that point, the first and second logs are handled by first bucking line stop-loader and second bucking line stop-loader 44 and 46 respectively. The logs are then dropped onto first bucking line cradle 48 and second bucking line cradle 50 respectively.

The first scanned and barked log lying in the first bucking line cradle 48 and the second scanned and barked log lying in the second bucking line cradle 50 are then, as determined by the computer scan, are respectively positioned by the first bucking line positioner 50 and the second bucking line positioner 54 to move them to optimum saw cut positions. This feature of the log bucking areas is unique and highly efficient. Once the first and second logs are located respectively by the first bucking line positioner 52 and the second bucking line positioner 54, in the optimum positions, they are respectively cut by the first bucking line saw 56 and the second bucking line saw 58. As shown in Figure 4, there are a pair of cut-off saws 56 and 58 in both the first and second log handling lines. The pairs of cut-off saws 56 and 58 are mounted on rollers and tracks so the distances between the pairs of saws in the respective cut saws 56 and 58 can be varied. The positions are controlled by the computer.

Once the first and second logs have been cut into respective segments by the first and second bucking saws 56 and 58, the logs are conveyed away from the bucking saws 56 and 58 by respective first bucking line outfeed conveyor 60 and second bucking line outfeed conveyor 62. The velocity of travel of the first and second logs is accelerated respectively by first bucking line log accelerator 64 and second bucking line log accelerator 66. The logs then reach respectively the first bucking line log sort conveyor 68 and the second bucking line log sort conveyor 70. Subsequently, the first and second logs are swept laterally by first bucking line sweep No. 1 and log catcher 72, and second bucking line sweep No. 1 and log catcher 74. As shown in Figure 4, the log bucking area is set up with a pair of cut-off saws in each of the parallel log bucking lines, which thereby cuts the scanned

logs into three separate segments. The components, according to the length of each cut segment, are sorted by first bucking line sweep No. 76 and second bucking line sweep No. 78 and first bucking line sweep No. 3 and second bucking line sweep No. 80, 82, as determined by the computer and according to the length of the segments that have been cut for each cut log, into three separate groups as indicated by the arrows.

Figure 5 illustrates an end elevation of one of the cut-off saws with log cradle and outfeed conveyor. The cut-off saw 50 is shown in both an upper and lower position (the latter shown in dotted lines). The bucking saw 56 (cut-off saw) has a counterweight 57 to reduce energy consumption when the saw is raised and lowered.

As seen in end view in Figure 5, the log (leftmost circle) enters the cut-off saw area on first bucking line conveyor 36. A sweep (not shown) then moves the log laterally to a notch in the first bucking line stop-loader 44. When stop-loader 44 is rotated to move the notch to the right (see dotted line) the log drops downwardly into first bucking line cradle 48. At that point, and to minimize travel time, the saw 56 has already been lowered in advance to an elevation slightly higher than the log diameter. This is determined by the computer from the log scan taken previously. When the log is held in the cradle 48, the saw 56 then cuts it at the optimum location as determined by the log scan. Once the log is cut, then the second stop 49 rotates to the right and permits the cut log to drop from the notch onto bucking line outfeed conveyor 60.

Figures 6a, 6b and 6c illustrate respectively plan, side and end elevations of the cut-off saw area log positioner. The position of piston 53, according to scan data received from the scanner, and analyzed by the computer, maximizes the location of the cut points on the debarked log lying in the cradle 48. The log positioner 52 extends the hydraulic piston 53 against the butt end of the log and moves it to an optimum log cutting location in the cradle 48 (see Figure 5), as determined by the computer. Figure 6(b) illustrates a side view of the log positioner 52 with the piston 53 retracted. Figure 6(c) illustrates an end elevation of the log positioner 52.

The positioner 52 is innovative and unique. It enables the log lying in the cradle 48, in stop 49, to be moved to any optimum location as determined by

the computer. It also enables the log to be positioned so that only the small end of the log is cut off and goes to hog. This is true whether the log is lying in the cradle head first or tail first. In this way, the more valuable butt log ends with greater diameter are not wasted. The log positioner 52, by being controlled by the computer, also enables the log to be positioned regardless of any central datum line. It is therefore not necessary to calculate log position according to a datum line. The computer, in combination with the log positioner 52, also controls the positions of the first and second cut-off saws 56 and 58, so that in combination, optimum lengths of log are cut, thereby minimizing wood loss due to log sweep, log crooks, and other deformities in the log.

Figure 7 is an end section view of the raw log collecting and dual quadrant area, taken along section line 1 of Figure 1. As seen in Figure 7, the pair of dual quadrant log singulators 12 and 14 are shown on each side of the log decks 4 and 6. The log grappler 3, as shown, drops raw logs on the respective first barker infeed deck 4 and the second barker infeed deck 6. After the logs have been singulated by the first dual quadrant singulator 12 and second dual quadrant singulator 14 respectively, they are moved to first barker infeed conveyor 16 and second barker infeed conveyor 18 respectively.

Figure 8 is an end section view of the dual side by side log debarkers, taken along section line 2 of Figure 1. As seen in Figure 8, the parallel positioned first debarker 24 and second debarker 26 are shown in side by side relation directly downstream from the conveyors 16 and 18 (see Figure 7). The barking area operator cab 84, while not shown, is located immediately upstream of the pair of barkers 24 and 26 and enables the operator to view the entire log deck and singulating area.

Figure 9 is an end section view of the dual and cut log take away deck, taken along section line 3 of Figure 1. As seen in Figure 9, the first barker outfeed conveyor 28 and second barker outfeed conveyor 30 are shown in side by side relation. A pair of log sort conveyors 68 and 70 are also shown. While not shown in Figure 9, the first, second and third group of bucking line sweeps 72, 76 and 80, and the second trio of second bucking line sweeps 74, 78 and 82 (see Figure 1) move the cut logs laterally onto the sort deck and ultimately to a step feeder 90, which conveys the logs away to a sawmill, or some other suitable cut log handling facility.

Figure 10 is a schematic of the computer monitor display showing scanned log profile form the scanner. As seen in Figure 10, the scanned profiles of two parallel logs are shown in the upper portion of the screen. The locations of the two cuts on each log are also shown. The profiles of three log sections are shown in the lower portion of the screen.

Figure 11 is a schematic of the computer monitor display showing variables of the log bucking system. Figure 11 displays, among other things, the three sort decks, log pusher position (actual and demand) for each saw and total logs cut in line 1 and line 2 as of the time of the display.

As will be apparent to those skilled in the art in the light of the foregoing disclosure, many alterations and modifications are possible in the practice of this invention without departing from the spirit or scope thereof. Accordingly, the scope of the invention is to be construed in accordance with the substance defined by the following claims.

WHAT IS CLAIMED IS:

1. A log processing and cutting system comprising:

(a) a log infeed deck;

(b) a log feeder;

(c) a dual quadrant singulator located downstream of the log feeder;

(d) an infeed conveyor;

(e) a log barker located downstream of the barker infeed conveyor;

(f) a barker outfeed conveyor located downstream of the log debarker;

(g) a bucking line scanner which scans the debarked log and by means of an associated computer, determines the log profile of the debarked log and determines optimum cutting locations on the log;

(h) a conveyor located downstream of the bucking line scanner for conveying the scanned log to a bucking line;

(i) a cradle in which the scanned log is held;

(j) a bucking line positioner which contacts an end of the scanned log and moves it to an optimum position for cutting by a cut-off saw;

(k) a bucking line cut-off saw which cuts the log at the optimum location determined by the computer from the log profile information ascertained by the scanner;

(l) a bucking line outfeed conveyor located downstream of the cut-off saw for conveying away the cut log; and

(m) a log sorter which directs the cut log to a log sorting station.

2. A system as claimed in claim 1 wherein the dual quadrant singulator comprises a lower quadrant singulator and an upper quadrant singulator, the pair of singulators operating in combination to single out and elevate individual logs.

3. A system as claimed in claim 1 wherein the debarker incorporates rotating rings, which hold debarking knives and the force exerted on the cutting knives and the speed of rotation of the rings are varied according to log profile characteristics of an individual log.

4. A system as claimed in claim 1 wherein the bucking line scanner determines the log profile by three laser scans, to determine the volume and shape of the log being scanned at incremental log lengths.

5. A system as claimed in claim 1 wherein the computer instructs the cut-off saw to move in advance of the log reaching the cradle in order to minimize saw travel during the log cutting operation.

6. A system as claimed in claim 1 wherein the log positioner comprises a hydraulic piston and cylinder, the piston extending a specified distance as determined by the computer, based on log profile and volume data as determined by the log scanner, and thereby positioning the log in optimum position.

7. A system as claimed in claim 1 wherein the system includes a pair of spaced apart cut-off saws, the locations of the pair of cut-off saws being variable according to optimum saw location cut points on the log to be cut, as determined by the computer based on log scan data determined by the scanner.

8. A log cutting system comprising:

(a) a log feeder;

(b) a bucking line scanner which scans a log on the feeder and by means of an associated computer, determines the log profile of the debarked log and determines optimum cutting locations on the log;

(c) a conveyor located downstream of the bucking line scanner for conveying the scanned log to a bucking cradle;

(d) a cradle in which the scanned log is held;

(e) a bucking line positioner which contacts an end of the scanned log and moves it to an optimum position for cutting by a cut-off saw;

(f) a cut-off saw which cuts the log at the optimum location determined by the computer from the log profile information ascertained by the scanner; and

(g) an outfeed conveyor which conveys away the cut log.

9. A system as claimed in claim 8 wherein the bucking line scanner determines the log profile by three laser scans, to determine the volume and shape of the log being scanned at incremental log lengths.

10. A system as claimed in claim 8 wherein the computer instructs the cut-off saw to move in advance of the log reaching the cradle in order to minimize saw travel during the log cutting operation.

11. A system as claimed in claim 8 wherein the log positioner comprises a hydraulic piston and cylinder, the piston extending a specified distance as determined by the computer, based on log profile and volume data as determined by the log scanner, and thereby positioning the log in optimum position.

12. A system as claimed in claim 8 wherein the system includes a pair of spaced apart cut-off saws, the locations of the pair of cut-off saws being variable according to optimum saw location cut points on the log to be cut, as determined by the computer based on log scan data determined by the scanner.

13. A log processing system comprising:

(a) a log infeed deck;

(b) a log feeder;

(c) a dual quadrant singulator located downstream of the log feeder;

(d) an infeed conveyor;

(e) a log barker located downstream of the barker infeed conveyor;

(f) a barker outfeed conveyor located downstream of the log debarker;

(g) a bucking line scanner which scans the debarked log and by means of an associated computer, determines the log profile of the debarked log and determines optimum cutting locations on the log; and

(h) a conveyor located downstream of the bucking line scanner for conveying the scanned log to a bucking line.

14. A system as claimed in claim 13 wherein the dual quadrant singulator comprises a lower quadrant singulator and an upper quadrant singulator, the pair of singulators operating in combination to single out and elevate individual logs. 250

219

15. A system as claimed in claim 13 wherein the debarker incorporates rotating rings, which hold debarking knives and the force exerted on the cutting knives and the speed of rotation of the rings are varied according to log profile characteristics of an individual log. 700 110 109 159

16. A system as claimed in claim 13 wherein the bucking line scanner determines the log profile by three laser scans, to determine the volume and shape of the log being scanned at incremental log lengths. 171

356 364 89 75.5 209 229 422 198 156

17. A method of processing and cutting logs comprising:

(a) singulating logs using a dual quadrant singulator;

(b) debarking the logs using a variable speed ring and knife system;

(c) scanning the debarked log by means of an associated computer, which determines the log profile of the debarked log and determines optimum cutting locations on the log;

(d) conveying the scanned log to a bucking line cradle;

(e) using a bucking line positioner which contacts an end of the scanned log and moves it to an optimum position for cutting;

(f) cutting the log at the optimum locations as determined by the computer from the log profile information ascertained by the scanner and according to the positioner;

(g) conveying the cut log away from the cutting area; and

(h) sorting the cut log according to a command from the computer.

18. A method as claimed in claim 17 wherein the dual quadrant singulator comprises a lower quadrant singulator which lifts the log to a first elevation and an upper quadrant singulator, which lifts the log to a second elevation.

19. A method as claimed in claim 17 wherein the rotating rings of the debarker hold cutting knives and the force exerted by the cutting knives on the log and the speed of rotation of the rings are varied according to log profile characteristics of an individual log.

20. A method as claimed in claim 17 wherein the scanning of the log is done by three laser scans, which determine the volume and shape of the log being scanned at incremental log lengths.

21. A method as claimed in claim 17 wherein a computer commands a saw to move in advance of the log reaching the cradle to thereby minimize saw travel during the log cutting operation.

22. A method as claimed in claim 17 wherein the log is positioned in the cradle by a piston which extends a specified distance as determined by the computer, based on log profile and volume data as determined by the log scanner, and thereby positioning the log in optimum position.

23. A method as claimed in claim 17 wherein the log is cut at two locations, the locations of the cuts being determined as optimum by the computer based on log scan data ascertained by the scanner.

24. A method of cutting logs comprising:

(a) a log feeder;

(b) a bucking line scanner which scans a log on the feeder and by means of an associated computer, determines the log profile of the debarked log and determines optimum cutting locations on the log;

(c) a conveyor located downstream of the bucking line scanner for conveying the scanned log to a bucking cradle;

(d) a cradle in which the scanned log is held;

(e) a bucking line positioner which contacts an end of the scanned log and moves it to an optimum position for cutting by a cut-off saw;

(f) a cut-off saw which cuts the log at the optimum location determined by the computer from the log profile information ascertained by the scanner; and

(g) an outfeed conveyor which conveys away the cut log.

25. A method as claimed in claim 24 wherein the bucking line scanner determines the log profile by three laser scans, to determine the volume and shape of the log being scanned at incremental log lengths.

26. A method as claimed in claim 24 wherein the computer instructs the cut-off saw to move in advance of the log reaching the cradle in order to minimize saw travel during the log cutting operation.

27. A method as claimed in claim 24 wherein the log positioner comprises a hydraulic piston and cylinder, the piston extending a specified distance as determined by the computer, based on log profile and volume data as determined by the log scanner, and thereby positioning the log in optimum position.

28. A method as claimed in claim 24 wherein the system includes a pair of spaced apart cut-off saws, the locations of the pair of cut-off saws being variable according to optimum saw location cut points on the log to be cut, as determined by the computer based on log scan data determined by the scanner.

29. A method of processing logs comprising:

(a) a log infeed deck;

(b) a log feeder;

(c) a dual quadrant singulator located downstream of the log feeder;

(d) an infeed conveyor;

(e) a log barker located downstream of the barker infeed conveyor;

(f) a barker outfeed conveyor located downstream of the log debarker;

(g) a bucking line scanner which scans the debarked log and by means of an associated computer, determines the log profile of the debarked log and determines optimum cutting locations on the log; and

(h) a conveyor located downstream of the bucking line scanner for conveying the scanned log to a bucking line.

30. A method as claimed in claim 29 wherein the dual quadrant singulator comprises a lower quadrant singulator and an upper quadrant singulator, the pair of singulators operating in combination to single out and elevate individual logs.

31. A method as claimed in claim 29 wherein the debarker incorporates rotating rings, which hold debarking knives and the force exerted on the cutting knives and the speed of rotation of the rings are varied according to log profile characteristics of an individual log.

32. A method as claimed in claim 29 wherein the bucking line scanner determines the log profile by three laser scans, to determine the volume and shape of the log being scanned at incremental log lengths.

Abstract of the Disclosure

A log handling and cutting system which cuts logs into lengths, and allows for maximum use of fiber. The system includes equipment for singulating the logs, optimally removing the bark from the logs, scanning the true log image, cutting the logs to length, and sorting the cut logs arranged in a sequence of coupled operations. The logs are singulated using a dual quadrant singulation system to provide maximum singulation reliability, thereby allowing a single operator to attend to this process. Once singulated, the logs are fed automatically into a debarker where the diameter and volume are scanned and debarker-operating parameters are set for optimum bark removal. The log is then scanned, tree length, using a unique scanning system, which determines the true image of the log. This enables the determination by computer of the optimum bucking solution of the log as well as a proper sorting of the optimum random lengths. The saws are adjusted in response to the computer solution and the log is positioned by a positioner according to a computer generated reference datum. This results in the log being positioned for cutting to the optimum random lengths. A command signal is sent from the computer to the log sorting system, which tracks the position of the random lengths and allows them to be sorted to the appropriate sort storage bin.

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GOSO/mib

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor of the invention entitled:

METHOD AND APPARATUS FOR SINGULATING, DEBARKING, SCANNING AND AUTOMATICALLY SAWING AND SORTING LOGS INTO LENGTHS

which is described and claimed in:

X the attached specification; or,
___ the specification in application Serial No. ________, filed ___ _______; or,
___ as amended on ___________; or,
___ PCT international application No. _________ filed ______, as amended under Article 19 on _________ and/or under Article 34 on _________ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge my duty to disclose information which is material to the patentability of this invention in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby appoint the following attorney(s) and/or agent(s), with full powers of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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Canada V6B 1G1

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issuing thereon.

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PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number

1026 8889

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS		
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	minus 20=	*
INDEPENDENT CLAIMS	minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐ OR OTHER THAN SMALL ENTITY

RATE	FEE		RATE	FEE
BASIC FEE	370.00	OR	BASIC FEE	740.00
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL		OR	TOTAL	740

CLAIMS AS AMENDED - PART II

SMALL ENTITY OR OTHER THAN SMALL ENTITY

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

PATENT APPLICATION SERIAL NO. ____________________

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

10/16/2002 EFLORES 00000063 10268889
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PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 489-267/69033

CLAIMS ONLY

SERIAL NO. | FILING DATE

APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
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TOTAL IND.	2					
TOTAL DEP.	6					
TOTAL CLAIMS	8					

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TOTAL IND.						
TOTAL DEP.						
TOTAL CLAIMS						

* *MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS*

U.S.DEPARTMENT OF COMMERCE
Patent and Trademark Office

*U.S. GPO: 1998-

L.N.
#2/IDS
11-18-02

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GOSO/mib

Paper No.:____

J1017 U.S. PTO
10/268889
10/11/02

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Inventor(s):	STARR, Donald
Title:	METHOD AND APPARATUS FOR SINGULATING, DEBARKING, SCANNING AND AUTOMATICALLY SAWING AND SORTING LOGS INTO LENGTHS
Serial No.:	Unassigned
Filed:	Herewith
Examiner:	W.D. Bray Art Unit: 3725
Date:	9 October 2002

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Disclosure Statement Pursuant to 37 C.F.R. §1.56

Preliminary to the examination of this divisional application, the applicant wishes to draw the Examiner's attention to the references listed on the attached copy of form PTO-1449, which were cited in parent application Serial No. 09/712,295, filed 15 November 2000. Copies of these references are not enclosed because they are available in the above-mentioned parent application.

REMARKS

This submission does not represent that a search has been made or that no better art exists and does not constitute an admission that each or all of the listed documents are material or constitute "prior art". If the Examiner applies any of the documents as prior art against any claim in the application and applicant determines that the cited documents do not constitute "prior art" under United States law, applicant reserves the right to present the relevant facts and law regarding the appropriate status of such documents.

Applicant further reserves the right to take appropriate action to establish the patentability of the disclosed invention over the listed documents, should one or more of the documents be applied against the claims of the present application.

Respectfully submitted,

By: ______________________

Gerald O.S. Oyen
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e-mail: goyen@patentable.com

Vancouver, B.C.
CANADA

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11/18/02

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GOSO/mib

Paper No.:____

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Inventor(s):	STARR, Donald
Title:	METHOD AND APPARATUS FOR SINGULATING, DEBARKING, SCANNING AND AUTOMATICALLY SAWING AND SORTING LOGS INTO LENGTHS
Serial No.:	Not assigned
Filed:	Herewith
Examiner:	W.D. Bray Art Unit: 3725
Date:	9 October 2002

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

PRELIMINARY AMENDMENT

Please enter the following amendments prior to examination of the attached patent application, which is a true copy of the parent application filed pursuant to the provisions of 37 CFR §1.60:

IN THE SPECIFICATION

Please amend the specification as follows:

At page 1, please add at line 4, after the title, the following cross-reference to the parent application:

CROSS-REFERENCE TO RELATED APPLICATION

A1 This application is a divisional of U.S. Patent Application Serial No. 09/712,295, filed 15 November 2000, the disclosure of which is incorporated herein by reference.

IN THE CLAIMS

Please cancel claims 1-7, 8-12,17-23 and 24-28, without prejudice.

REMARKS

This Amendment is submitted prior to examination of the above-identified Divisional Patent Application, which is a true copy of parent application Serial No. 09/712,295, filed 15 November 2000. The specification has been amended on page 1 to insert a priority claim to parent U.S. Patent Application Serial No. 09/712,295, claims 1-7 and 17-23 of which were allowed on 18 September 2000. Claims 1-7 and 17-23, which were examined and allowed in the parent application, have been cancelled. Applicants have also cancelled claims 8-12 and 24-28 which are being filed in a first divisional application.

Attached hereto is a marked-up version of the changes made to the specification and claims. The attached page is captioned "Version with Markings to Show Changes Made". A favorable first action on the merits is respectfully requested. The Examiner is requested to telephone the undersigned at the number shown below if there are any issues requiring resolution.

Finally, the Examiner is authorized to charge Applicant's Deposit Account No. 02-1037 for any charges in connection with this Preliminary Amendment.

Respectfully submitted,

By: ______________________

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fax: 604.681.4081
e-mail: goyen@patentable.com

Vancouver, B.C.
CANADA

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification

The following paragraph has been added, beginning at line 4 of page 1:

CROSS-REFERENCE TO RELATED APPLICATION

This application is a divisional of U.S. Patent Application Serial No. 09/712,295, filed 15 November 2000, the disclosure of which is incorporated herein by reference.

In the Claims

Claims 1-7, 8-12, 17-23 and 24-28 have been cancelled without prejudice.

The temperature gradient gel electrophorese system can also be used to measure the efficiency, i.e. the replication velocity in the above described meaning, respectively, to compare it with the one of the wt-enzyme. As described by Henco et al. [Nucleic Acids Res. (1990)], the temperature gradient gel electrophorese system can be used for the exact quantification of nucleic acids in a probe, whereby the accuracy being ± 15%. In this way, the relative synthesis power of a wild-type polymerase and of a mutant polymerase can be quantified in a cell-free in vitro system or cell culture by means of their respective nucleic acid synthesis products.

The described processes can be used analogously for the discovery and classification of polymerase mutants of other virus/host systems which are applicable according to the invention. When in bacteria, as in the case of tobacco mosaic virus (TMV) - in analogy to the plaque formation - clonal, virus caused lesions can be detected in leafs, exits the possibility to conclude from the morphology of single lesions to the presence of viral polymerase mutants with elevated rate of misincorporation. TMV causes necrotic local lesions to N-gene-tobacco (N. glutinosa, N. tabacum cv. Xanthi-nc, respectively, Samsun NN) [Atabekov]. The reactions lead to localization of the virus infection around the sites of the primary infestation. Temperature sensitive mutants are not able to form the respective product in a functional state at elevated temperatures (e.g., 32 °C). Such mutants are existing as well for the coat protein a for the transport protein. The functions of the RNA-covering, respectively, of the cell-to-cell transport are disturbed under non permissive conditions. On the other hand, the necrotic reaction of the N-gene-tobacco is also temperature dependent. The localization fails to appear and the TMV (wild-type) is spread over the leaf spreading at elevated temperature (e.g., 32 °C). A collapse of the tissue will occur when returning to normal temperature. The necrotization leads to large-area, perga-

ment-like segments. By combined use of N-gene-tobacco and Ts-mutants another picture can be expected. Even if the necrotization and localization fails to appear at elevated temperatures, no virus spreading will occur since the transport function is switched off under non permissive conditions.
A necrosis formation will occur when returning to normal temperature, as if a temperature treatment never had been performed. Since it is a matter of well characterized point mutants in the case of the experimental mutants of the virus, the rate or back-mutation can be estimated by defective replicase activity by of the symptom picture after differential temperature treatment.